

FHWA Road Weather Management Program Publications

TITLE	ABSTRACT	SOURCE(S)
ADVANCED DECISION SUPPORT FOR WINTER ROAD MAINTENANCE	The MDSS is a decision support tool that has the ability to provide weather predictions focused toward the road surface. These predictions are then merged with customized rules of practice that have been captured from maintenance managers and coded into a computer algorithm. An initial demonstration of the MDSS prototype was deployed and evaluated during the second half of the winter of 2002-2003 in central Iowa. It is hoped that after the winter 2003-2004 demonstration that the system will be mature enough to be championed by the private sector and to be embraced by the states.	Pennsylvania Borough News, Volume 03, Issue 10; FHWA & Mitretek Systems
AN INTRODUCTION TO STANDARDS FOR ROAD WEATHER INFORMATION SYSTEMS (RWIS)	This brochure describes three categories of standards being considered for RWIS applications: siting standards, calibration standards, and communication standards. Note that the term "standard" refers to guidelines, recommended procedures, protocols, and other practices that formalize some of the processes involved in deploying and maintaining RWIS sensors. The standards described here are still being developed and are not mandated by the U.S. Department of Transportation. The U.S. DOT encourages agencies to use this brochure as a starting point to learn about RWIS standards and to consider how they might use these standards to reinforce their own RWIS operations.	http://www.ops.fhwa.dot.gov/weather/Publications/RWIS_brochure.pdf
AN OVERVIEW OF FEDERAL HIGHWAY ADMINISTRATION ROAD WEATHER MANAGEMENT PROGRAM ACTIVITIES	The Road Weather Management program of the Federal Highway Administration (FHWA) seeks to understand weather impacts on roads and promote techniques to improve roadway operations in inclement weather. This paper presents an overview of program objectives, various research and outreach projects, as well as tools used by traffic, emergency and maintenance managers.	American Meteorological Society 83rd Annual Meeting (2003), Mitretek Systems, ITS Division
AN OVERVIEW OF SURFACE TRANSPORTATION WEATHER RESEARCH CONDUCTED THROUGH THE COOPERATIVE PROGRAM FOR OPERATIONAL METEOROLOGY, EDUCATION AND TRAINING (COMET)	In 2001, the National Weather Service (NWS) and the Federal Highway Administration (FHWA) began a joint research effort to evaluate how ESS data can best be used for both road condition forecasting and broader weather forecasting. This paper will describe the five research projects and their results to date. The five projects selected are located in Iowa, Nevada, New York, Pennsylvania, and Utah.	American Meteorological Society 83rd Annual Meeting (2003), Mitretek Systems, ITS Division

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ANALYSIS OF WEATHER IMPACTS ON TRAFFIC FLOW IN METROPOLITAN WASHINGTON, D.C.	The Federal Highway Administration's (FHWA) Road Weather Management Program (RWMP) has been sponsoring research into the impacts of weather on surface transportation. One specific research task involved attempting to quantify the amount of travel delay imposed upon drivers due to the effects of inclement weather. This paper describes two different methods used to approximate travel delay impacts of weather along specific roadway segments around metropolitan Washington, D.C.	Institute of Transportation Engineers 2003 Annual Meeting, Mitretek Systems, ITS Division
ANALYSIS OF WEATHER-RELATED CRASHES ON U.S. HIGHWAYS	This paper presents results of an analysis of crashes on U.S. highways in poor road weather conditions. The objectives of the analysis were to update a March 2001 report titled "A Preliminary Analysis of U.S. Highway Crashes Against an Exposure Index", and to identify trends in the frequency of weather-related crashes.	Mitretek Systems, ITS Division
CURRENT PRACTICES IN TRANSPORTATION MANAGEMENT DURING INCLEMENT WEATHER	Best practices include road weather and traffic surveillance to assess threats to transportation system performance, arterial and freeway management to regulate roadway capacity, as well as dissemination of advisory information to influence traveler decisions and driver behavior. These management practices are employed in response to various weather threats including low visibility, high winds, precipitation, hurricanes, flooding, and avalanches. Weather-related transportation management practices (1) improve mobility by increasing roadway capacity and promoting uniform traffic flow, (2) increase public safety by minimizing crash risk and exposure to hazards, as well as (3) enhance the safety and productivity of road maintenance personnel.	Institute of Transportation Engineers 2002 Annual Meeting, Mitretek Systems, ITS Division
EVALUATION OF THE FORETELL CONSORTIUM OPERATIONAL TEST: WEATHER INFORMATION FOR SURFACE TRANSPORTATION	Defines strategy for conducting an independent evaluation of the FORETELL project, a regional road and weather forecasting/dissemination system in Iowa, Wisconsin, and Missouri.	http://www.itsdocs.fhwa.dot.gov/jpdocs/repts_te/7tr01!.pdf
EVALUATION OF THE FORETELL FIELD OPERATIONAL TEST	The FHWA supported development of an operational test of a multi-regional road and weather forecasting/dissemination system, known as FORETELL. The operational test in Iowa, Wisconsin, and Missouri has been completed. However, FORETELL continues as a private sector service in Iowa and is now being assessed in the Northeast states of Maine, New Hampshire, and Vermont. This flyer describes the capabilities of the map-based FORETELL system and summarizes evaluation results.	FHWA

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MANUAL OF PRACTICE FOR AN EFFECTIVE ANTI-ICING PROGRAM: A GUIDE FOR HIGHWAY WINTER MAINTENANCE PERSONNEL	Highway anti-icing is the snow and ice control practice of preventing the formation or development of bonded snow and ice by timely applications of a chemical freezing-point depressant. This manual provides information for successful implementation of an effective highway anti-icing program. It is written to guide the maintenance manager in developing a systematic and efficient practice for maintaining roads in the best conditions possible during a winter storm. It describes the significant factors that should be understood and must be addressed in an anti-icing program, with the recognition that the development of the program must be based on the specific needs of the site or region within its reach. The manual includes recommendations for anti-icing practices and guidance for conducting anti-icing operations during specific precipitation and weather events.	http://www.fhwa.dot.gov/reports/mopeap/eapcov.htm
RESEARCH NEEDS FOR WEATHER-RESPONSIVE TRAFFIC MANAGEMENT	Weather-responsive traffic management views weather events as non-recurring incidents that can be predicted, observed, and mitigated. This paper reports weather impacts on traffic flow and describes an emerging concept of operations for a system-wide approach to traffic management in adverse weather. The paper discusses this structured approach to assess weather impacts and implement operational strategies that improve safety, mobility, and productivity. Finally, research needs to advance the state-of-the-practice in weather-responsive traffic management are enumerated.	Transportation Research Board 83rd Annual Meeting (2004), FHWA and Mitretek Systems, ITS Division
SOUTHEAST UNITED STATES HURRICANE EVACUATION TRAFFIC STUDY	Study to address problems during the Hurricane Floyd evacuation. The study documents behavioral analysis, Evacuation Travel Demand Forecast Model, reverse lane standards, and ITS strategies.	www.fhwaetis.com/etis
SURFACE TRANSPORTATION WEATHER APPLICATIONS	Weather threatens surface transportation nationwide and impacts roadway mobility, safety, and productivity. There is a perception that traffic managers can do little about weather. However, three types of mitigation measures—control, treatment, and advisory strategies—may be employed in response to weather threats. Road weather data sharing, analysis, and integration are critical to the development of better road weather management strategies. Environmental information serves as decision support to traffic, maintenance, and emergency managers; and allows motorists to cope with weather effects through trip deferrals, route detours, or driving behavior.	Institute of Transportation Engineers 2002 Annual Meeting, Mitretek Systems ITS Division

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SURFACE TRANSPORTATION WEATHER DECISION SUPPORT REQUIREMENTS	This series of documents presents the latest findings of the ongoing Surface Transportation Weather Decision Support Requirements (STWDSR) project. STWDSR Draft Version 1.0 documents the weather information requirements of all road users and operators. STWDSR Draft Version 2.0 focuses on the decision support requirements of a particular stakeholder group--winter road maintenance engineers. It also presents an operational concept for a Weather Information for Surface Transportation Decision Support System (WIST-DSS).	http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/94f01!.pdf http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/9dc01!.pdf http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/9db01!.pdf http://www.itsdocs.fhwa.dot.gov/jpodocs/EDLBrow/401!.pdf http://www.itsdocs.fhwa.dot.gov/jpodocs/repts_te/@701!.pdf
THE WINTER MAINTENANCE DECISION SUPPORT SYSTEM (MDSS): DEMONSTRATION RESULTS AND FUTURE PLANS	The Federal Highway Administration (FHWA) has sponsored development of a winter Maintenance Decision Support System (MDSS) functional prototype. During the winter of 2002-2003, the prototype was deployed at several maintenance garages in central Iowa for a field demonstration. This paper documents the implementation of the demonstration, summarizes the lessons learned, includes verification statistics and discusses technology transfer activities. The paper also describes plans for a longer, more comprehensive demonstration during the winter of 2003-2004.	American Meteorological Society 83rd Annual Meeting (2003); FHWA, Mitretek Systems & National Center for Atmospheric Research
WEATHER IMPACTS ON ARTERIAL TRAFFIC FLOW	This paper synthesizes literature regarding weather effects on traffic flow along signalized arterial roadways. Generally, weather impacts traffic by reducing visibility, decreasing pavement friction, as well as impacting driver behavior and vehicle performance (e.g., traction, stability, maneuverability). Weather effects on roads and traffic are presented, relevant literature is reviewed, and findings from the literature are summarized in the conclusion.	Mitretek Systems, ITS Division

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TITLE	ABSTRACT	SOURCE(S)
WEATHER IN THE INFO-STRUCTURE	This paper addresses the Weather Response component of the Infostructure. It's primary purpose is to discuss the fundamental data needs of the weather infostructure component, and to estimate an aggregate cost for national deployment of road weather data collection systems. It does this by first documenting a methodology for determining the number of Road Weather Information System (RWIS) sensors (or ESS) needed across the country to support basic road weather needs, and then documenting a methodology for determining the cost.	Cambridge Systematics, Inc. and Mitretek Systems
WEATHER: MAKING IT A NATIONAL PRIORITY IN SURFACE TRANSPORTATION	Includes "A National Program for Surface Transportation Weather Applications" by Pisano & Nelson; "An Advanced Winter Road Decision Support System" by Mahoney; "Research Needs in Weather Information for Surface Transportation--The Perspective of the User Community" by Nixon; "Utilizing FAA-Developed Automated Weather Algorithms for Improving Surface Transportation Operations in Adverse Weather" by Hallowell; "Foretell--Some Findings and their Research Implications" by Davies, Choudhry & Canales; "Future Growth of Surface Transportation Weather: An Academic Question" by Osborne; and "Private Sector Meteorology and ITS" by Smith.	www.ops.fhwa.dot.gov/weather/publications/its_america.pdf
WEATHER-RESPONSIVE TRAFFIC MANAGEMENT CONCEPT OF OPERATIONS: DRAFT	The purpose of this paper is to provide a concise summary of a concept of operation and associated research needs pertaining to weather-responsive transportation management. The primary focus of this paper is on the needs and activities of freeway and arterial transportation managers, and how these needs change or differ during Adverse weather. However, the concept of operations also involves transportation-related activities or others including public transportation managers, public safety personnel, highway maintenance personnel, and emergency response personnel.	Cambridge Systematics, Inc.

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<p>WINTER MAINTENANCE VIRTUAL CLEARINGHOUSE: TECHNICAL BRIEFS</p>	<p>This web site contains technical briefs of weather-responsive strategies used in 28 states. Titles include "Making Snow-Covered Roads Easier to Open" (AK), "Protecting a National Forest with New Snow Removal Methods" (CA), "Anti-Icing Saves Time and Money" (CO), "Road and Weather Data Give Colorado DOT a Jump on Snow Storms and Avalanches" (CO), "New Weather System Keeps Routes Open in the Nation's Capitol" (DC), "Protected by Snow Fences, Idaho Road Stays Open to Traffic" (ID), "Better Weather and Pavement Information Mean Faster Storm Cleanup" (IL), "Snow and Ice Control: The New Generation", "Iowa Gets a Jump on Storms with New Technology" (IA), "Snow Fences Increase Visibility and Reduce Drifts" (IA), "Anti-Icing Improves Road Safety" (KS), "Beating Winter Storms to the Punch with an Advance Warning System" (KS), "Timing Is Key to Effective Winter Maintenance in Maryland" (MD), "Clearer Roads at Less Cost" (MA), "Michigan Finds a Solution for Icy Bridges" (MI), "Monitoring System Gives Highway Crews the Edge in Winter Maintenance" (MN), "Snow Fences Spell End of Blocked Highways" (MN) "Weather Monitoring Stations Improve Maintenance Operations" (MN), "Anti-Icing Techniques: Key to Safer Roads" (MO), "Weather System Saves Money and Improves Service" (MO), "Weather Monitoring Stations Improve Maintenance Operations" (MT), "Keeping the Snow at Bay" (NE), "A Cleaner, Safer Way to the Slopes" (NV), "Snow Fences Prove To Be a Valuable Maintenance Tool" (NV), "Advanced Cutting Edge Clears More Ice in New Hampshire" (NH), "Real-Time Data Slashes Winter Maintenance Costs" (NJ), "No More Snow Drifts on Upstate Road" (NY), "Weather Information System Helps Keep North Dakota Roads Clear" (ND), "Saving Money and the Environment" (OR), "Timing is Everything with Winter Maintenance" (SD), "Information Helps Schedule Operations Year-Round" (TX), "Making Better Use of Snow Fences", "New Technology Slashes Winter Maintenance Costs" (WV), "A Preemptive Strike on Ice" (WA), "Clear Roads Ahead for Wisconsin Counties" (WI), and "Snow Fences Save Money and Lives" (WY).</p>	<p>http://www.fhwa.dot.gov/winter/briefs/briefs.html</p>

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